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Inventory Mapping and Performance of Large Manufacturing Firms in Kenya: Moderating Role of Information Technology Integration

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ABSTRACT

Purpose: This study explored the relationship between inventory mapping and performance of Large Manufacturing Firms in Kenya. The study also analysed the moderating effects of information technology integration on relationship between inventory mapping and performance of Large Manufacturing Firms in Kenya.

Methodology: The study adopted cross sectional research design. The target population was 1659 managers working in supply chain, production and finance departments in large manufacturing firms in Kenya based on the 14 sectors obtained from Kenya Association of Manufacturers. The study used stratified random sampling to select a sample of 322 managers from finance, production, and supply chain. Primary data was collected through use of questionnaires. 10% of the sample size was piloted to test for validity and reliability of the research instrument. Data collected was analysed using SPSS version 26. Descriptive and inferential statistics was used to analyse the data. The findings were presented in tables and figures.

Findings: The study concluded that outbound logistics mapping positively and significantly influences performance of large manufacturing firms in Kenya. In addition, the study concluded that inventory mapping positively and significantly influences performance of large manufacturing firms in Kenya.

Unique Contribution to Theory, Policy and Practice: This study contributes to Six Sigma theory by showing that logistics and inventory mapping, strengthened by information technology integration, are key drivers of performance in large manufacturing firms. It informs policy by highlighting the need to support technology-enabled supply chain practices, and guides practice by demonstrating how integrated mapping approaches can enhance efficiency and competitiveness in the manufacturing sector.

Keywords: *Inventory Mapping, Information Technology Integration, Large Manufacturing Firms*

1.0 INTRODUCTION

In an ever-changing business environment, organizational performance remains the central focus in utilizing value chain management. Manufacturing firms, too, operate in a dynamic market that motivates the utilization of models such as value chain management to achieve superior performance (Kurniawati & Susanto, 2021). Value chain mapping have been executed to optimize resource utilization, minimize costs, and improve operational efficiency to achieve firm performance. According to Phan et al (2019), value chain management practices create end-user satisfaction and realize the performance objectives in the manufacturing industry. Supporting this view, Chia and Tan (2022) the mapping of the value chain requires examining processes and uncertainties from the beginning to the end of the value chain in an integrated manner to enhance value chain optimization. Mapping of the value chain through inbound logistics, production scheduling, and Operations Management determines the extent to which firms achieve expected performance goals (Goh & Zailani, 2020)

Firms in manufacturing industry are deploying measures to achieve expected performance goals globally. Manufacturing firms are operating in volatile and competitive environment market and customers are increasingly demanding. In this context, Manufacturing firms are facing myriad challenges in value chain operations reporting decline in efficiency, poor competitiveness, delivery in quality of product delivered to end user customers, increase in product defects, delays in delivery of products, increase in wastage and low operation optimization linked closure of firms operations, stagnation in growth and decline in performance (Dufresne, 2021). While there are many options taken by management to foster performance in manufacturing firms, management has focused more on value chain mapping in an efforts to enhance process efficiency to ensure competitiveness. Debala, *et al* (2023) asserted that value chain mapping f**oste**r optimization of the production process, value-added activities, non-value-added activities, waste reduction and defections and errors elimination to improve performance. Inventory optimization and operational efficiency are two critical aspects of supply chain management that are essential for the success of any business (Dacha et al., 2023; Fathurrahman & Hakim, 2020). Inventory optimization refers to the process of efficiently managing inventory levels to meet demand while minimizing costs. Operational efficiency, on the other hand, involves maximizing productivity while minimizing waste and reducing costs (Ahmad & Siddiqui, 2021). The nexus between inventory optimization and operational efficiency is an area of growing concern, especially in today's highly competitive business environment (Panigrahi *et al*., 2022). Organizations are increasingly seeking ways to improve their supply chain management processes to enhance their competitiveness, reduce costs, and improve customer satisfaction. A proficient inventory optimization system can offer significant competitive advantages to firms by reducing costs, enhancing operations, and ensuring profitability (Abade et al., 2024).

Inventory precision, also known as inventory accuracy, is a crucial factor that influences the operational efficiency of businesses. The ability to maintain accurate inventory levels can help firms optimize their production processes, reduce waste, and meet customer demand in a timely manner (Debala et al., 2023). As a result, several studies have explored the relationship between inventory precision and operational efficiency. The literature on inventory precision and operational efficiency is relatively sparse, with only a handful of studies focused on this topic. One of the earliest works in this area was Rinehart's survey of inventory accuracy at the US Navy depot of Rhode Island in 1960. While this study provided some initial insights into the importance of accurate inventory management, it was limited to a single case and may not be generalizable to other contexts (Jafari, & Aliakbari, 2020). More recently, Ruiz-Moreno andDiaz-Chao(2020) investigation into the level of inventory caused by inactivity has been considered a pioneering study in the field of inventory accuracy research. However, it is important to note that this study was focused on a specific issue related to inventory management and did not specifically examine the relationship between inventory precision and operational efficiency.

Technology integration in the manufacturing industry, lead to intense competition in the business world. The companies deploy value chain mapping in various ways to satisfy the consumer by trying to produce a high-quality product with a competitive price, provide a good service and the timeliness in the delivery. Real-time demand database improve the timeliness of deliveries and reduce inventory levels. Inventory is the stock of any goods or resources used in a company or organization. The integration inventory system is a set of policies and controls that are used in production and logistics networks to coordinate supply cycles overseeing the level of inventory to be refilled, the number of orders that must be regulated to reduce risks associated with uncertainty.

Large manufacturing firms in Kenya are typically defined as companies that are large in size, scale, and resources and engage in large-scale production of goods and services. The definition of a large manufacturing firm can vary depending on the context, but it can be based on factors such as number of employees, revenue, and market share (Kuo et al., 2021). Companies with more than 500 employees, revenue exceeding 100 million, and market share of over 10% are often considered to be large manufacturing firms in Kenya (Kipkoros & Odhiambo, 2025). The large manufacturing firms is a significant contributor to Kenya's economy resulting in a 10% Gross Domestic Product, 12.5% exports and a 13% formal employment. The manufacturing environment has changed however with such considerations as globalization, technology development etc. therefore this has led to manufacturers of all sizes realizing that if their value chain was both efficient and effective they would be profitable. However with an appreciation of the presence of challenges and so proper analysis and improvements in the value chain would lead to greater benefits. The management of a value stream would result in improved service, growth in market share, suppliers and distribution channels and provides invaluable analytics for continuous improvement (Johnson & Weng, 2022).

1.2 Statement of the Problem-

In Kenya, Manufacturing firms have continued to face myriad of challenges ranging from disclosure and transparency, corporate transactions and financial performance monitoring. Large scale manufacturers in Kenya registered stagnation and declining profits for the last five years due to a turbulent operating environment as well as non-alignment of their respective logistics operations (Kumar & Sharma, 2020).Manufacturing growth for the period 2028-2024 can be said to be erratic. Over the period, lowest manufacturing growth rates were registered in 2012 and 2024 at 0.6% and -0.1% (Economic Survey, 2025). In 2024, several companies announced their exit from the Kenyan market including Procter & Gamble (P&G), American multinational consumer goods corporation revealed plans to lay off approximately 850 employees as it prepares to cease operations in Nairobi by December 2024. This decision was driven by the high cost of doing business in Kenya , Titanium, an Australian mining company announced that it would exit the Kenyan market due to dwindling titanium resources while Tile and Carpet Centre indicated plans for redundancies within its production department starting December 6, 2024, increased operational costs, inefficiency in manufacturing processes and outbound and distributions challeges. Cadbury Kenya closed down its manufacturing plant in Nairobi after its net profits fell by 58.7 per cent to $493,237 from $784,783 while Eveready Ltd reduced its production capacity to 50 million units annually, down from a previous high of 180 million per year (RoK, 2024). On the other hand, Tata Chemicals Magadi scaled down its operations by closing down its main factory. Management in manufacturing have focus on value chain mapping in an effort to achieve set performance goals with emphasize being on lead time, value-added activities, and a process cycle efficiency and improvement actions being executed to achieve waste, increase competitiveness and firm performance(Pude, et al. 2023).However, it remain unclear the extent to which value chain mapping contribute to performance in large management firms in Kenya.

Integration of information technology in value chain mapping has gain momentum as firm sought measure to achieve performance goals. Value chain mapping information technology integrated aims to identify and eliminate waste throughout the system, minimize resources used, and optimize organizational performance. Abade, *et al*. (2024) asserted that IT moderated supplier capability to aching performance of food and beverage manufacturing firms in Kenya. However, the role played by it integration in value chain mapping and firm performance in manufacturing industry in Kenya has not been established. This motivate the current study to determine the moderating effect of IT integration in the relationship between value chain mapping and performance in large manufacturing firms in Kenya.

2.0 Theoretical Framework

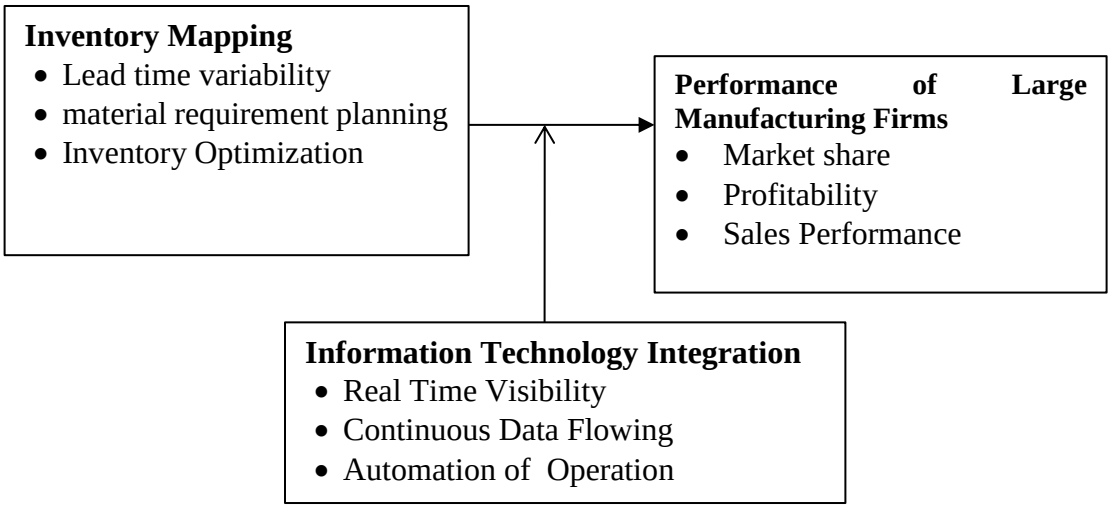
The Six Sigma theory was developed by Bill Smith Taiichi Ohno in 1986, focuses on improving quality by identifying and eliminating defects in processes and products (Kumar, Kumar & Gul,

2024). The core assumption of lean six sigma is that any process can be measured, analyzed, improved, and controlled through a data-driven approach. Lean Six Sigma employs a structured methodology known as Define, Measure, Analyze, Improve, Control (DMAIC) to systematically identify and eliminate sources of variation, thereby achieving near-perfect quality. By adopting Six Sigma principles, development can enhance its operational performance by reducing process variability, improving process efficiency, and ensuring high-quality service delivery. The integration of Lean principles with Six Sigma further amplifies these benefits by simultaneously addressing waste reduction and quality improvement. In practical terms, implementing Six Sigma involve training staff in Six Sigma methodologies and tools, such as statistical analysis, process mapping, and root cause analysis. By equipping employees with these skills, manufacturing companies foster a culture of quality and continuous improvement, enabling the organization to systematically identify and address operational inefficiencies. Six Sigma's data-driven quality improvement approach collectively offer a robust foundation for enhancing firm performance (Todeva & Knoke, 2021)

Then, techniques, lean manufacturing and work study are required to install for helping improve the productivity for each of these logistics areas. Lean Sig Sigma Theory support value chain mapping tools like value stream mapping, 5S(Sort ,Set in Order, Shine, Standardize and Sustain), Single-Minute Exchange of Die (SMED), and standardized work, which focus on specific aspects of a manufacturing process to eliminate waste and improve quality while reducing production time and cost (Mahmood & Baki, M. 2020). Through Lean Six Sigma theory application in outbound logistic mapping is linked to firm performance as firm achieve reduction in waste; minimize processes variation, cost reductions and improving customer satisfaction (Sinha & Gupta, 2021)

The VCOR model was developed from the perspective of being a value chain framework with the development of Seven Performance Attributes linking the three domains of Product Development, SCM and Customer Chain across the supply networks together. IT integration within the Value Chain Operations Reference (VCOR) framework is crucial for enabling seamless information flow, collaboration among trading partners, and the development of robust, adaptive business models (Ibrahim & Ali, 2021). The VCOR model, an extension of the Supply Chain Operations Reference (SCOR) model, focuses on integrating the concepts of the entire value chain (including product development, SCM, and customer chain) to manage processes from a customer-centric point of view. IT Integration in VCOR enables collaborations, foster flow of information, support virtuals firms, enable system integrations, ease decision making, enhance flexibility and adaptability. In essence, IT integration provides the essential nervous system for the VCOR framework, turning a collection of independent entities into a cohesive and responsive value chain capable of achieving a firm performance (Kamble, et al. 2020).

2.1 Conceptual Framework



Independent Variables **Moderating Variable** **Dependent Variable**

Figure 1: Conceptual Framework

2.3 Empirical Review

Kiplagat (2024) determine the influence of lead time system on performance of manufacturing firms in Kenya. To achieve the research objective, the study deployed descriptive survey research design. The target population comprised of 903 manufacturing firms. Collected data was processed and analyzed using descriptive and inferential statistics. The results of the data analysis were presented in charts and tables. Results revealed lead time system contributed to significant and significant relationship with performance of manufacturing firms in Kenya. Lead time scheme significantly impact on performance of manufacturing firms in Kenya. The study focused on the relationship between lead time scheme and performance while the current focused on lead time variability and performance of large manufacturing firms in Kenya.

Mohammed and Mandal (2024) assessed the impact of lead time variability on operational efficiency, cost management, and service delivery in manufacturing and retail sectors in Nigeria.The study was implemented using a mixed-methods approach is adopted, combining quantitative analysis through simulation modeling and qualitative insights derived from case studies of companies in the manufacturing and retail sectors. The simulation model accounts for different levels of lead time variability and its influence on stockouts, excess inventory, and overall supply chain responsiveness. Case studies are used to illustrate real-world challenges and strategies employed by businesses to mitigate the effects of lead time fluctuations. The results revealed higher lead time variability leads to increased inventory costs, stockouts, and delays in product deliveries, advanced demand forecasting and more resilient supplier relationships can significantly

reduce the negative impact of lead time uncertainty. The current study seeks to find out the extent lead time variability impact on performance of large manufacturing firms in Kenya.

An empirical study by Kithure and Nyang'au (2022). Assessed the extent material requirement planning linked to operational performance in the East African Manufacturing Industry. The study adopted descriptive survey research design with a target population of 10 selected manufacturing firms in East Africa. Data was collected using self-administered questionnaires. Analysis of data was done using descriptive and inferential statistics. The results revealed elementary scheduling system, inventory control, capacity requirement planning and demand forecasting significantly contributed to operational performance in selected manufacturing firms in East African Kamalu,et al. (2024) examined the relationship between material requirement planning and supply chain performance of multinational fast moving consumer goods (FMCG) companies in Port Harcourt in Nigeria. The study was executed using survey research design where top ten (10) multinational fast moving consumer goods companies in Port Harcourt. The Pearson Product Moment Correlation was utilized to assess the extent material requirement planning impact on supply chain performance in moving consumer goods companies in Port Harcourt. The result of the analysis revealed that material requirement planning significantly relates with supply chain performance of multinational fast moving consumer goods companies in Port Harcourt in Nigeria. An empirical study by Akintokunbo and Obom (2021) examined the relationship between material requirement planning and supply chain performance of Oil and Gas firms in Rivers State, Nigeria. The study adopted an explanatory research design where the population of 293 and a sample size of 149 drawned.Data collection was done using questionnaire The data was analyzed using the Pearson's Product Moment Correlation statistic .The revealed existence of significant and positive relationship between material requirement planning in value chain management and supply chain performance in oil and gas manufacturing firms in River State in Nigeria.

Gemachis, Mohd and Shagufta (2023) explored the link between inventory optimization and operational efficiency in public sector organizations in Ethiopia. The study specifically examined the role of Capacity utilization, Inventory precision, IT infrastructure, administrative purchasing procedures, Workforce competence and proficiency, Record-keeping towards achieving optimal inventory management and operational efficiency in these organizations. The research is based on a quantitative approach, with primary data collected through a survey of 186 public sector organizations in Ethiopia. Utilizing a descriptive and explanatory research design, primary and secondary data were collected and analyzed through the application of SPSS version 24 and presented with descriptive and inferential statistics. The finding revealed that a significant and positive correlation between inventory optimization and operational efficiency in public sector organizations in Ethiopia Additionally, multiple regression analysis revealed that inventory utilization, administrative purchasing procedures, record-keeping and documentation, staff skills

and knowledge, inventory accuracy, and IT infrastructure have a significant impact on operational efficiency.

Sudarmi and Sunaryo (2024) assessed the relationship between enhancing inventory accuracy and operational performance with ER across industries. This narrative review explores the role of Enterprise Resource Planning (ERP) systems in enhancing inventory management across industries. Drawing from empirical studies, theoretical reviews, and case applications over the past 15 years, it highlights how ERP systems improve operational efficiency, inventory accuracy, and supply chain responsiveness. The results also revealed that execution of enterprise resource planning system contribute significantly to operational efficiency in manufacturing firms, inventory accuracy, optimization stock handling and operational cost reduction within industrial enterprises, offering greater flexibility in production scheduling and faster product delivery cycles and shortened order cycle times in manufacturing firms.

Naas and Berass (2025) assessed the optimization of the value chain through management control on Public Enterprise Management. The study deployed case study focusing on monitoring control and optimization the value chain in public sector enterprises. By providing a detailed analysis of internal processes, it enables managers to identify inefficiencies, such as bottlenecks or low-yield activities, and implement targeted solutions. This data-driven approach empowers leaders to make informed strategic decisions while ensuring the methodical monitoring of operational performance. As a result, managers can drive corrective actions that not only improve productivity but also strengthen the company's competitiveness in an ever-evolving environment. The case study presented demonstrates the effectiveness of this approach, illustrating that adaptability and responsiveness to market changes are key factors in ensuring long-term sustainability and growth. The study revealed that optimization of the value chain and accuracy in monitoring through management control impact on Public Enterprise performance.

3.0 RESEARCH METHODOLOGY

This study adopted cross-sectional research design (Mikkelsen, et al, 2020). A cross-sectional study is a type of research design in which you collect data from many different individuals at a single point in time. In cross-sectional research, you observe variables without influencing them. Additionally, cross-sectional studies have been found to be robust for effects of relationships studies. This design was chosen because it applies closely to the research objectives of this study and is practical in testing the study hypotheses in trying to investigate the effect of the independent variables (value chain mapping) on dependent variable (performance of large manufacturing firms in Kenya).

The foundations of positivism can be found in empiricism, which states that all factual knowledge depends on positive information received through observable experiences (Giorgi, 1970). Only analytic propositions can be recognized as accurate via reason. Positivism holds that knowledge

should be founded on facts rather than abstractions; hence knowledge is founded on observations and experiments based on current theory. In the positivist paradigm, an epistemological study is how the social world can be explored as natural science. Hypotheses must be tested using empirical methods. Target population is the entire set of individuals (or objects) having the same characteristics as pointed out in the sampling criteria used for the study. The target population makes a part of the universal population (Hennink et al., 2020). According to KAM (2022), there are 533 large manufacturing firms in Kenya. Slovin's formula is used in statistical analysis as a tool to determine the sample size of 322 large manufacturing firms in Kenya

The study's research instruments used both structured and semi-structured questionnaires. The semi-structured questions give respondents freedom of expression while in structured questions, respondents are limited to the five-point likert scale questions. The data collected was quantitative and qualitative in nature. The analysis of quantitative data was done using descriptive statistics including frequencies and percentages. Mean and standard deviations were also used to describe the distribution of the various responses (Bell et al., 2020). The study also computed inferential statistics which include correlation and regression analysis.

The Multiple regression model took the form;

$Y = \beta_0 + \beta_1 X_1 + + \varepsilon$ ……. Equation 1

Whereby; Y = Performance of Large Manufacturing firms (Dependent Variable)

β_0= constant

β_{1-} = The coefficients of all Independent Variables

X_1 = Inventory mapping

ε = Error Term

The moderating effect was tested using model 3 as follows;

$Y = \beta_0 + \beta_1 X_1 + \beta_6 X_1 M + \varepsilon$……. Equation 3

Where, M = information technology integration (moderating variable)

$X_5 M$= the interaction between independent variable and the moderating variable

4.0 RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

The researcher distributed 322 questionnaires to the respondents during data collection process and 322 were fully filled and returned to the researcher thus making a response rate of 100%. That a response rate which is more than 50% is considered adequate while excellent response rate is usually above 70%.

4.2 Inventory mapping and Performance of Large Manufacturing Firms

The study sought to establish the influence of inventory mapping on performance of large manufacturing firms in Kenya. The results in Table 1, respondents strongly agreed that there is lead time variability is focused on achieving quality products (M=4.2702, and SD= 0.73517) . From the results, majority of the respondents agreed that there is material requirement planning driven ordering as supported by a mean of 4.1304 with a standard deviation of 0.53687. The results in Table 1 the respondents agreed that Inventory visibility enables real-time on-hand inventory change postings and visibility tracking across data sources and channels. Also, respondents agreed that utilization of real time value chain management to optimize manufacturing processes, agile and responsive to foster efficiency in the firms (M=4.4379, SD=0.50928). The results in Table 1. respondents agreed that there is supplier monitoring to achieve delivery times in large manufacturing firms in Kenya (M=4.3509, SD=0.62985).

The findings in Table 1. respondents strongly agreed (M=4.5714, SD=0.62985) that dispatching of customer orders are done fast in respective large manufacturing firms , greed that there is purchase order tracking to enhance delivery efficiency as indicated by a mean of 4.4472 and that respondents strongly agreed that customer order processing is done without delays in large manufacturing firms in Kenya as supported by 4.3075 and standard deviation 0.46216 supporting that customer order processing is done without delays in large manufacturing firms in Kenya. The results in Table 1. showed that respondents strongly agreed that accurate forecasting ensures continuous production processes in large manufacturing firms in Kenya .Further, majority of the respondents strongly agreed that there is there is vendor replenishes inventory in large manufacturing's = 4.6553 and SD=.47602).

Table 1: Inventory mapping and Performance of Large Man. Firms

Statements.	Mean	Std. Dev
Lead time variability is focused on achieving quality products	4.2702	.73517
There is material requirement planning driven ordering	4.1304	.53687
Inventory visibility enables real-time on-hand inventory change postings and visibility tracking across data sources and channels	4.3727	.67736
There is utilization of real time value chain management to optimize manufacturing processes, agile and responsive to foster efficiency in the firms	4.4379	.50928
There is supplier monitoring to achieve delivery times	4.3509	.62985
Dispatching of customer orders are done fast	4.5714	.49564
There is purchase order tracking to enhance delivery efficiency	4.4472	.49798
Customer order processing is done without delays	4.3075	.46216
Accurate forecasting ensures continuous production processes	4.7795	.41523
There is vendor replenishes inventory	4.6553	.47602
Aggregate		

4.3 Information Technology Integration and Performance of Large Man. Firms

The study assesses the extent of technology integration in large manufacturing in Kenya. The deployment of technology in value mapping in manufacturing firms to achieve performance. The findings in Table 2. most of the respondents agreed as supported by M=4.208, SD=.46470 that large manufacturing companies uses large manufacturing firms in Kenya use radio frequency identification to facilitate inventory traceability.

From the results in Table 2, most respondents strongly agree (M=4.6863, SD=0.46470) that use radio frequency identification to facilitate inventory traceability, most of the respondents strongly agreed (M=4.4845, SD=0.66610) that RFID tags provide real time visibility into manufacturing operations to enhance value chain mapping.

Results in Table 2 respondents agreed (M=4.4161, SD=.49369) that RFID tags provides manufacturing operators with continuous data flow to improve decision making, while other respondents strongly agreed (M=4.4876, SD=0.73296 that large manufacturing firm invests in upgrading and maintaining technological infrastructure to support manufacturing operations, 22.3% agreed and 14.3% were neutral . Innovative technologies play a great role in achieve value chain mapping in manufacturing firms. From the results in Table 2, respondents agreed that large manufacturing firms actively seek out innovative technologies to improve production efficiency

and product quality. Respondents strongly agreed that large manufacturing firms updates and improves its technology and systems to ensure they are the latest and most efficient as supported by M= 4.4099, SD= 0.72749).

From the results in Table 2, most (of the respondents agreed that large manufacturing firms had adequate employees with technical skills supported by mean of 4.4286 with a standard deviation of 0 .49564 clearly indicated that large manufacturing firms deploy adequate employees with technical skills to enhance value chain mapping to achieve firm performance. Also, majority of the respondents strongly agreed (M=4.7702, SD=0.43590) that regular training is done on employees to equip them with technical skills in large manufacturing firms . From the results, respondents agreed (M=4.0702, SD=0.43590) that Automation is a key aspect of our manufacturing processes, helping us achieve higher levels of consistency and precision, while other respondents agreed (M=3.718, SD=0.792) that they were satisfied with the effectiveness of technical capacity in large manufacturing firms in Kenya.

Table 2: Information Technology Integration and Performance of large Man. Firms

	Mean	Std. Dev
Large manufacturing firms use radio frequency identification to facilitate inventory traceability	4.2081	0.87730
We use radio frequency identification to facilitate inventory traceability	4.6863	.46470
RFID tags provide real time visibility into manufacturing operations.	4.4845	.66610
RFID tags provides manufacturing operators with continuous data flow to improve decision making	4.4161	.49369
Our organization invests in upgrading and maintaining technological infrastructure to support manufacturing operations.	4.4876	.73296
We actively seek out innovative technologies to improve production efficiency and product quality.	4.2267	.59711
Our organization updates and improves its technology and systems to ensure they are the latest and most efficient	4.4099	.72749
Our organization had adequate employees with technical skills	4.4286	.49564
Regular training is done on employees to equip them with technical skills	4.7702	.43590
Am satisfied with the effectiveness of technical capacity in our organization	3.718	0.792
Automation is a key aspect of our manufacturing processes, helping us achieve higher levels of consistency and precision.	4.0702	.43590

4.4 Performance of Large Manufacturing Firms in Kenya

The study sought the extent large manufacturing firms achieve performance goals. From the results in Table 3, respondents strongly agreed (M= 4.3882, SD= 0.86553) that large manufacturing firms achieved market share through increase asset base. The results in Table 3., respondents agreed that there is increase in customer retention rate, clearly demonstrated that large manufacturing firms achieve an increase in customer retention rate. From the result in Table 3 , respondents agreed that the large manufacturing companies have increased on sale revenue, clearly indicated that value chain mapping has led to increased on sale revenue in large manufacturing companies. From the results in Table 3, most of the respondents agreed (M=3.8789, SD=.5430) that large manufacturing firms have experienced increased sale volumes due to value chain mapping. The results in Table 3. most 40.4% of the respondent agreed (M=3.9068, SD=0.96222) that large manufacturing firms recorded increase in return on assets and return on investments. This demonstrated that enhance value chain mapping contributes to increase in return on assets in large manufacturing firms in Kenya. The results in Table 3 most , respondents agreed (M=4.3199, SD=.46715) that large manufacturing firms have improved on profitability due to value chain mapping. On the extent respondents agreed with the statement, the large manufacturing forms reported increase in operational margin profit for the study period, agreed, (M=4.1087, SD=1.20124) that the large manufacturing firms reported increase in operational margin profit due to effective value chain mapping. The results in Table 3, respondents strongly agreed there is increase in number of customers as supported by a M=4.3385, SD=.67001. Further, from the results in Table 3, most of the respondents agreed that the large manufacturing firms reported improvement in competitive advantage,

Table 3: Performance of Large Manufacturing Firm

Statements.	Mean	Std.Dev
Our company has expanded its market share through increase asset base	4.3882	.86553
There is increase in customer retention rate	3.9534	.48754
The sales revenue of the company has increased	4.4224	.80218
Our firm have experienced increased sale volumes	3.8789	.54300
The company recorded increase in return on assets and return on investments	3.9068	.96222
Our company has improved on its profitability	4.3199	.46715
The company reported increase in operational margin profit for the study period	4.1087	1.20124
There is increase in number of customers	4.3385	.67001
The company reported improvement in competitive advantage	4.2019	.86085

4.5 Correlation Analysis

The study used correlation analysis results to detect the strength and the direction of the predicted relationship between value chain mapping and firm performance of large manufacturing companies in Kenya. The results in Table 4 indicated that there exists a strong, significant and positive correlation between inventory mapping and firm performance of large manufacturing companies in Kenya, r=0.830, PV=0.001<0.01). The result predicts a strong, significant and positive relationship between inventory and firm performance of large manufacturing companies in Kenya. The implied that adequate inventory value mapping predict increase in firm performance of large manufacturing companies in Kenya.

Table 4: Correlation Coefficients

		Performance of Large Manufacturing Firms
Inventory mapping	Pearson Correlation	-.830**
	Sig.(2-tailed)	.001
	N	322

4.6 Regression Analysis

Table 5: Model Summary for Inventory Mapping and firm performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.516[a]	.266	.262	10.92255

a. Predictors: (Constant), Inventory Mapping

The model summary in Table 5 indicates the R-squared is 0.266, indicating that there exists a variation between inventory mapping and firm performance of large manufacturing companies in Kenya. The model summary finding indicates R^2 =0.266, Std Error= 10.92255, revealing that inventory mapping contributes to a significant variation at 26.6% of large performance in large manufacturing firms in Kenya.

Table 6: Analysis of Variance for Inventory Mapping and firm performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13803.041	2	6901.521	57.849	.000[b]
	Residual	38057.347	319	119.302		
	Total	51860.388	321			

a. Dependent Variable: Firm Performance of Large Manufacturing Companies in Kenya

b. Predictors: (Constant), Inventory mapping

The ANOVA was used to determine whether the model was a good fit for the data. The ANOVA results in Table 6 indicate that the F-calculated was 40.885 with a PV 0.000< 0.05. The F-calculated is greater than f-critical; this clearly demonstrated that the simple regression model $Y = \beta 0 + \beta_2 X_2 + \varepsilon$ adopted by the study had significant goodness of fit as Fcal=57.849 far exceeds the Fcri= 0.09 and PV=0.000<0.05. The F calculated 57.849, with PV=0.000 was far greater than F-Critical 3.8706. The condition $F_{Cal.} = 57.849 > F_{Cri.}=3.9146$) and PV=0.001 indicate that the null hypothesis is rejected and the alternative hypothesis is accepted that there exists a significant relationship between inventory mapping and performance of large manufacturing firms in Kenya. Therefore, the model can be used to predict the influence of inventory mapping on the performance of large manufacturing firms in Kenya.

Table 7: Regression Coefficients for Inventory Mapping and Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	133.572	14.100		9.474	.000
	Inventory mapping	1.712	.268	-.337	-6.394	.000

a Dependent Variable: performance of large manufacturing firms in Kenya

The regression model was as follows:

$\mathbf{Y} = 133.572 + 1.712\mathbf{0}\ X_2 + \varepsilon$

From the results in Table 7, inventory mapping has a significant positive influence on performance of large manufacturing firms in Kenya 1.712, p-value= 0.000<0.05). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings clearly indicated that an increase in inventory mapping would contribute to an increase by 1.712 of performance of large manufacturing companies in Kenya. The condition of null hypothesis where $\beta_2 \neq 0$, PV=0.000<0.05 is rejected and the alternative hypothesis accepted. Therefore, inventory mapping has a significant and negative performance of large manufacturing companies in Kenya.

4.12.9 Moderated Multiple Regression Model on Inventory Mapping And Firm Performance

The study tested the moderating effect of Information technological integration on the relationship between inventory mapping and the sales performance of large manufacturing firms in Kenya. Using the model as follows;

$Y(S\ performance) = \beta_0 + \beta_1 X_1 + \beta_2 Z + \varepsilon.$

The condition $R^2 2 > R^2 1$ and the differences in R squared being 0.238 as a result of the difference between $R^2 2 = 0.771$ and $R^2 1 = 0.566$ in Table 8 indicate that the alternative hypothesis is supported. Upon introduction of IT integration in inventory mapping , there was increased in variation of performance to 77.1% from 56.6% .This suggests that information technology integration has a significant and positive moderating effect on the relationship between inventory mapping and the performance of large manufacturing firms.

Table 8: Model Summary for Moderated Multiple Regression Model on Inventory Mapping and Sales Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.753[a]	.566	.561	10.30679
1	.878[a]	.771	.767	7.50591

Predictors: (Constant), Inventory mapping

Predictors: (Constant), Inventory mapping, Inventory mapping *Information technology integration

b. Dependent: S Performance of Large Manufacturing Companies in Kenya.

Table 9: Beta Coefficients for Moderated Multiple Regression Model on Inventory Mapping and Performance

Coefficients a Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	470.140	30.478		15.426	.000
	Inventory mapping	5.562	.376	.567	14.785	.000
	(Constant)	703.805	26.200		26.863	.000
2	Inventory mapping	4.591	.280	-.468	16.399	.000
	Inventory Mapping *IT Capability	.025	.001	.905	16.785	.000

b. performance of Large Manufacturing Companies in Kenya.

The study examined the moderating effect of technology integration on the relationship between value chain mapping and the sales performance of large manufacturing firms in Kenya. Multiple regression models were used to test whether Information technology integration had no significant moderating effect on the relationship between inventory mapping and the sales performance of large manufacturing firms in Kenya. From the results, the interaction coefficient was found to be

0.025 demonstrating that IT integration in inventory mapping contributes significantly to improvement in sales performance of large manufacturing firms in Kenya.

5.0 Summary of the Findings

Correlation results ascertained that there exists a strong, significant and positive (r=-0.830, PV=0.001<0.01) correlation between inventory mapping and firm performance of large manufacturing companies in Kenya. This finding were affirmed by regression results that significant (1.712, p-value= 0.000<0.05).) Inventory value mapping predict improvement in firm performance of large manufacturing companies in Kenya and that an increase in inventory mapping has a significant positive influence on performance of large manufacturing firms in Kenya. This clearly demonstrated that inventory value mapping through lead time variability, material requirement planning driven ordering ,inventory visibility enables real-time on-hand inventory change postings and visibility tracking across data sources and channels, utilization of real time value chain management ,supplier monitoring to achieve delivery times and dispatching of customer orders fast contribute significantly to performance in manufacturing firms in Kenya. Further, using purchase order tracking to enhance delivery efficiency , customer order processing is done without delays, accuracy forecasting ensures continuous production processes and vendor replenishes inventory significantly influence achievement of performance in large manufacturing firms in Kenya.

The study established that upon introduction of information technology integration in value chain mapping, $R^2 2 > R^2 1$ and the differences in R squared being 0.003 as a result of the difference between $R^2 2 = 0.735$ and $R^2 1 = 0.535$ affirming that information technology integration has a significant and positive moderating effect on the relationship between value chain mapping and the performance of large manufacturing firms. This demonstrated that information technological integration in value chain mapping significantly enhances the performance of large manufacturing firms in Kenya. The results demonstrated that IT integration in value chain mapping through utilization of radio frequency identification to facilitate inventory traceability, use of RFID tags provide real time visibility into large manufacturing firms operations, upgrading and maintaining technological infrastructure to support manufacturing operations, deployment of innovative technologies, updating and improves its technology and systems, automation is a key aspect of large manufacturing processes enhance value chain mapping fostering performance in large manufacturing firms in Kenya

5.1 Conclusions

From the results, the study concluded that Inventory value mapping predict improvement in firm performance of large manufacturing companies in Kenya and that an increase in inventory mapping has a significant positive influence on performance of large manufacturing firms in Kenya. The findings supported the facts inventory value mapping through lead time variability,

material requirement planning driven ordering ,inventory visibility enables real-time on-hand inventory change postings and visibility tracking across data sources and channels, utilization of real time value chain management ,supplier monitoring to achieve delivery times and dispatching of customer orders fast contribute significantly to performance in manufacturing firms in Kenya. Further, using purchase order tracking to enhance delivery efficiency , customer order processing is done without delays, accuracy forecasting ensures continuous production processes and vendor replenishes inventory significantly influence achievement of performance in large manufacturing firms in Kenya.

The study recommend that firm in manufacturing industry should deploy Inventory value mapping predict improvement in firm performance of large manufacturing companies in Kenya and that an increase in inventory mapping has a significant positive influence on performance of large manufacturing firms in Kenya.Invetory mapping should be done through lead time variability, material requirement planning driven ordering, inventory visibility enables real-time on-hand inventory change postings and visibility tracking across data sources and channels, utilization of real time value chain management ,supplier monitoring to achieve delivery times and dispatching of customer orders fast contribute significantly to performance in manufacturing firms in Kenya. Further, using purchase order tracking to enhance delivery efficiency, customer order processing is done without delays, accuracy forecasting ensures continuous production processes and vendor replenishes inventory significantly influence achievement of performance in large manufacturing firms in Kenya.

REFERENCE

Abade, A.Noor I. S., P Namusonge E., Wachiuri E. (2024). Value Chain Mapping On Performance Of Food And Beverage Manufacturing Firms In Kenya. *International Journal of Social Sciences Management and Entrepreneurshi*p 8(1): 329-347, 2024

Ahmad, I & Siddiqui, M. (2021). Value chain mapping for enhancing the operational performance of businesses in developing economies. *Global Business Review*, *22*(3), 617-631.

Chia, S. L & Tan, C. H. (2022). The impact of value chain mapping on business performance in the renewable energy sector. *Renewable and Sustainable Energy Reviews*, 157, 112038.

Dacha, V., Omwenga, J., Namusonge, E. (2023). Product returns practices and value chain performance in the food and beverage industry in Kenya. *International Academic Journal of Procurement and Supply Chain Management*, 3(2), 302-320.

Debala, G., Bhat, M. A., & Khan, S. T. (2023). Exploring the Nexus of inventory optimization and operational efficiency: Data-driven insights from public sector organizations in Ethiopia. *Cogent Business & Management, 10*(2). https://doi.org/10.1080/

Dufresne, A. (2021). Enhancing organizational performance through value chain analysis in the manufacturing industry. *Journal of Business and Industrial Marketing*, *36*(3), 500-513.

Fathurrahman, K. and Hakim, I. (2020). Improving the Loading and Unloading Process Efficiency with Lean Manufacturing Approach using Value Stream Mapping in Jakarta Container Yard. IOP Conference Series: *Materials Science and Engineering*. 1003. 012042. 10.1088/1757-899X/1003/1/012042.

Gemachis, B. & Bhat, M. & Shagufta., T.K. (2023). Exploring the Nexus of inventory optimization and operational efficiency: Data-driven insights from public sector organizations in Ethiopia. Cogent Business & Management. 10. 10.1080/23311975.2023.2213966.

Goh, M & Zailani, S. (2020). The role of value chain mapping in logistics and supply chain performance: Evidence from Malaysia. *Asia Pacific Journal of Marketing and Logistics*, *32*(6), 1192-1210.

Ibrahim, M. D & Ali, R. (2021). Value chain analysis in the context of organizational performance: A systematic review. *Management Review Quarterly*, *71*(3), 483-504.

Jafari, Y., & Aliakbari, M. (2020). Value chain analysis in improving organizational performance: The case of automotive industry. *International Journal of Automotive Technology and Management*, *20*(1), 51-68.

Johnson, P & Weng, Y. (2022). Value chain mapping: A tool for enhancing firm performance in manufacturing and service sectors. *Industrial Management & Data Systems*, *122*(4), 769-791.

Kamble, S., Gunasekaran, A., & Dhone, N. C. (2020). Industry 4.0 and lean manufacturing practices for sustainable organisational performance in Indian manufacturing companies. *International Journal of Production Research*, *58*(5), 1319-1337.

Kavilanz P (2019). *Dumped! Brand names fight to stay in stores*. CNNMoney.

Kipkoros, C.J & Odhiambo, C.(2025). Supply Chain Process Mapping and Supply Chain Performance of Food Manufacturing Firms in Nakuru County, Kenya. The International Journal of Business Management and Technology.9. 5 .126-135

Kithure,A.M. Nyang'au, S. P. Effect Of Material Requirement Planning On Performance Of Manufacturing Firms In Kenya. International Journal of Recent Research in Commerce Economics and Management (IJRRCEM) 9, 4, 143-150

Kumar, N & Sharma, S. (2020). Enhancing organizational performance through value chain mapping and optimization. *Journal of Supply Chain Management*, *56*(2), 111-130.

Kuo, T. C., Chen, K. J., Shiang, W. J., Huang, P. B., Otieno, W., & Chiu, M. C. (2021). A collaborative data-driven analytics of material resource management in smart supply chain by using a hybrid Industry 3.5 strategy. *Resources, Conservation and Recycling*, *164*, 105160.

Kurniawati, D & Susanto, H. (2021). An analysis of the impact of value chain mapping on the performance of SMEs in the food and beverage sector in Indonesia. *Journal of Small Business Management*, *59*(4), 665-686.

Mahmood, M & Baki, M. A. (2020). Value chain mapping as a strategic tool for operational performance: A case study of manufacturing SMEs. *International Journal of Operations & Production Management*, *40*(6), 755-779.

Mikkelsen, J.& Karpavice, J. & Tambo, T. (2022). Optimization of Packaging Processes for Special Orders Using Process Activity Mapping. 10.1007/978-3-030-90532-3_1.

Mohammed, I. A. & Mandal, J.(2024). The Impact of Lead Time Variability on Supply Chain Management. *International Journal of Supply Chain Management.* 9. 25-39. 10.47604/ijscm.3075.

Naas ,A.and Berass D. (2025). Optimization of the Value Chain through Management Control: Case Study of a Public Enterprise. *Economics and Finance*, 13, 1, 1-10

Phan, A. C., Nguyen, H. T., Nguyen, H. A., & Matsui, Y. (2019). Effect of inventory mapping practices and JIT production practices on flexibility performance: Empirical evidence from international manufacturing plants. *Sustainability*, *11*(11), 3093.

Pude, G. & Naik, G.& Naik, P.(2023). Application of Value Stream Mapping Tools For Process Improvement a Case Study in Foundry. 7-12.

Ruiz-Moreno, F & Diaz-Chao, A. (2020). Value chain mapping as a strategy for improving organizational performance in SMEs. *International Journal of Small Business and Entrepreneurship Research*, *8*(4), 43-56.

Sautma R.B. et al. (2025). The influence of Information Technology Integration on Firm Performance through Supply Chain Quality and Supply Chain Resilience. *Decision Science Letters.* 14 . 225–238. Accessed at : www.GrowingScience.com

Sinha, A & Gupta, V. (2021). The role of value chain mapping in improving operational efficiency and performance of small manufacturing firms. *Operations Management Research*, *14*(1-2), 55-68.

Sudarmi, E. & Sunaryo, W.. (2024). Enhancing Inventory Accuracy and Operational Performance with ERP. *Sinergi International Journal of Logistics*. 2. 1-14. 10.61194/sijl.v2i2.622.

Todeva, E & Knoke, D. (2021). Value chain mapping and its implications for competitive advantage in the digital era. *Journal of Strategic and International Studies*, *8*(2), 1-13.

Wang, F.-K., Rahardjo, B., & Rovira, P. R. (2022). Lean Six Sigma with Value Stream Mapping in Industry 4.0 for Human-Centered Workstation Design. Sustainability 14.7, 11020 Accessed on . https://doi.org/10.3390/su141711020